

**CURRICULUM  
FOR  
FIRST SEMESTER OF  
THREE-YEAR  
DIPLOMA COURSES IN  
POLYTECHNICS  
OF  
UNION TERRITORY OF  
JAMMU AND KASHMIR**

**CURRICULUM**

**FOR**

**FIRST SEMESTER**

**DIPLOMA IN**

**ENGINEERING AND TECHNOLOGY**

**[Civil Engineering(CE), Electrical Engineering(EE), Mechanical Engineering(ME),  
Automobile Engineering(AE), Electronics & Communication Engineering(EC), Computer  
Engineering(CO), Instrumentation & Control Engineering(IC) ;  
Architecture Assistantship(AA) ;  
Leather Technology(LT), Wood Technology(WT), Information Technology(IT), Food  
Technology(FT) and Textile Technology(TT) ]**

## SUBJECT STUDY SCHEME

| Course Code | Subjects                             | Time in Hours |          |           |            | Credits   |          |           |           |
|-------------|--------------------------------------|---------------|----------|-----------|------------|-----------|----------|-----------|-----------|
|             |                                      | Theory        | Tutorial | Practical | Total      | Theory    | Tutorial | Practical | Total     |
| HS 101      | Language and Communication Skill     | 3             | -----    | -----     | 3          | 3         | 0        | -----     | 3         |
| BS 102      | Physics                              | 3             | -----    | -----     | 3          | 3         | 0        | -----     | 3         |
| BS 103      | Chemistry and Environmental Sciences | 3             | -----    | -----     | 3          | 3         | 0        | -----     | 3         |
| BS 104      | Applied Math-I                       | 3             | 1        | -----     | 4          | 3         | 1        | 0         | 4         |
| ES 105      | Engineering Graphics                 | -----         | -----    | 4         | 4          | 0         | 0        | 2         | 2         |
| ES 106      | General Workshop Practice            | -----         | -----    | 4         | 4          | 0         | 0        | 2         | 2         |
| BS 107      | Physics Lab                          | -----         | -----    | 2         | 2          | -----     | -----    | 1         | 1         |
| BS 108      | Chemistry Lab                        | -----         | -----    | 2         | 2          | -----     | -----    | 1         | 1         |
| HS 109      | Language and Communication Skill Lab | -----         | -----    | 2         | 2          | -----     | -----    | 1         | 1         |
| HS 110      | Self-Learning/Life Skills            | 2             | -----    | -----     | 2          | 2         | 0        | -----     | 2         |
|             | <b>Total</b>                         | <b>14</b>     | <b>1</b> | <b>14</b> | <b>29*</b> | <b>14</b> | <b>1</b> | <b>7</b>  | <b>22</b> |

\* Note: The 4hrs in a week shall be utilized for sports and other activities like debates, seminars etc.

|   |   |
|---|---|
| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |   |
| Course Code: HS 101   | Course Title: Language and Communication skills |
| Semester: <b>1<sup>st</sup></b>   | Credits: <b>3</b>                               |
| Periods per week: <b>3 (L:3 T:0 P:0)</b>                                  |   |

**Course Objectives:** This course is designed to introduce students to various kinds of technical and professional communication. During the course, you will become familiar with technical communication, receive feedback from and provide feedback to others on writing drafts and revisions, discover the role good listening, speaking, reading, and writing skills plays in effective technical communication. The students will learn and experience ways to communicate effectively, particularly audience awareness and communication through technology and also learn ways to groom their personality. The students will find these vignettes beneficial for keeping and honing learning skills in their interpersonal communication as well as communication at workplace, and dispose them of wallowing in unhappy isolation. Above all, it will develop requisite skills among the students which in turn will enhance the employability of students. We hope the students will enjoy it with facility and felicity

**Prior learning requirements: NIL**

## **COURSE CONTENT**

### **UNIT 1: COMMUNICATION: THEORY AND PRACTICE (12 Hours)**

- Basics of communication: Introduction, meaning and definition, process of communication etc.
- Types of communication: formal and informal, verbal, non-verbal and written. Barriers to effective communication.
- 7 C's for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).
- Art of Effective communication,
  - Choosing words
  - Voice o Modulation o Clarity
  - Time
  - Simplification of words
- Technical Communication

### **UNIT 2: SOFT SKILLS FOR PROFESSIONAL EXCELLENCE (12Hours)**

- Introduction: Soft Skills and Hard Skills.
- Importance of soft skills.
- Important types of soft skills : Interview skills, Presentation skills, Group Discussion
- Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligence and empathy etc.
- Case Studies

### **UNIT 3: READING COMPREHENSION**

**(12 Hours)**

Comprehension, vocabulary enhancement, and grammar exercises based on reading of the following texts:

#### **Section-1**

Malgudi Days: R.K. Narayan  
The Room on Roof: Ruskin Bond  
"The Gift of the Magi" by O. Henry "  
The Cock –fight by Amin Kamil

#### **Section-2**

Night of the Scorpion by Nissim Ezekiel,  
Stopping by Woods on a Snowy Evening by Robert Frost,  
Where the Mind is Without Fear by Rabindranath Tagore,  
Ode to Tomatoes by Pablo Neruda,

### **UNIT 4: PROFESSIONAL WRITING**

**(12 Hours)**

- The art of precis writing,
- Letters: business and personal,
- Drafting e-mail, notices, minutes of a meeting, Job Application, CV/Resume writing etc.
- Filling-up different forms such as banks and on-line forms for placement etc.

**Course Outcome:**

After completion of this course the student will be able to:

**UNIT 1**

- Develop Verbal, Non-Verbal Communication such as proper use of body language and gestures.
- Develop the latest trends in basic verbal activities such as presentation and other forms of oral communication.

**UNIT 2**

- Learn Soft as well as hard skills.
- Master their life skills.

**UNIT 3**

- Comprehend different words in the context which in turn will enhance their Vocabulary and grammar.
- Read Correctly.

**UNIT 4**

- Develop writing skills including proper use of Language, & Vocabulary.
- Learn different formats of writing skills.

**Recommended Books:**

1. J.D. O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980
2. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Edition 2018)
3. M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi, 2002.
4. John Nielson. Effective Communication Skills. Xlibris, 2008.
5. Oxford Dictionary
6. Roget's Thesaurus of English Words and Phrases
7. Collin's English Dictionary

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| <b>UNIT NO</b> | <b>TIME (HOURS)</b> | <b>MARKS</b> |
|----------------|---------------------|--------------|
| 01             | 12                  | 25           |
| 02             | 12                  | 25           |
| 03             | 12                  | 25           |
| 04             | 12                  | 25           |
| <b>TOTAL</b>   | <b>48</b>           | <b>100</b>   |



|  |                       |
|--|-----------------------|
| <b>PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |                       |
| Course Code : BS 102   | Course Title: PHYSICS |
| Semester : 1 <sup>st</sup>   | Credits: 3            |
| Periods per week: 3 (L:3 T:0 P:0)  |                       |

**Course Objectives:**

The objective of the course is to understand the concept of Physics and World around us. The course shall help the students in understanding the basic principles which shall help in solution of Engineering Problems.

**Prior learning requirements:** This is the Basic course of Physics and does not require much prior knowledge of physics. However, concepts of Matter and High School level physics will give better understanding of the subject.

**COURSE CONTENT**

**UNIT 1: PHYSICAL WORLD, UNITS AND MEASUREMENTS (08 Hours)**

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units),

Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

**UNIT 2: FORCE AND MOTION**

**(08 Hours)**

Scalar and Vector quantities – examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller.

Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications.

Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist

**UNIT 3: ROTATIONAL MOTION**

**(08 Hours)**

Translational and rotational motions with examples, Definition of torque and angular momentum and their examples, Conservation of angular momentum (quantitative) and its applications. Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid)

**UNIT 4: WAVE MOTION AND ITS APPLICATIONS**

**(08 Hours)**

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation ( $y = r \sin wt.$ ) amplitude, phase, phase difference, principle of superposition of waves and beat formation.

Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. Simple harmonic progressive wave and energy transfer, study of vibration of cantilever and determination of its time period, Free, forced and resonant vibrations with examples.

Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

### **UNIT 5: OPTICS**

**(08 Hours)**

Basic optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.

Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.

### **UNIT 6: MODERN PHYSICS**

**(08 Hours)**

Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers.

Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors.

Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, nano technology based devices and applications.

**Course Outcome:**

After completion of this course the student will be able to:

**Unit1:**

- Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.

**Unit 2:**

- Represent physical quantities as scalar and vectors and solve real life relevant problems.
- Analyze type of motions and apply the formulation to understand banking of roads/railway tracks and conservation of momentum principle to describe rocket propulsion, recoil of gun etc.

**Unit 3:**

- Compare and relate physical properties associated with linear motion and rotational motion and apply conservation of angular momentum principle to known problems.

**Unit 4:**

- Describe waves and wave motion, periodic and simple harmonic motions and solve simple problems. Establish wave parameters: frequency, amplitude, wavelength, and velocity and able to explain diffraction, interference, polarization of waves.
- Explain ultrasonic waves and engineering, medical and industrial applications of Ultrasonics. Apply acoustics principles to various types of buildings for best sound effect.

**Unit 5:**

- State basic optical laws, establish the location of the images formed by mirrors and thin converging lens, design and assemble microscope using lenses combination.
- Describe refractive index of a liquid or a solid and will be able to explain conditions for total internal reflection.

**Unit 6:**

- Illustrate the conditions for light amplification in various LASER and laser-based instruments and optical devices.
- Appreciate the potential of optical fiber in fields of medicine and communication.
- Express importance of nanoscience and nanotechnology and impact of nanotechnology to the society.

**Recommended Books:**

1. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
2. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
4. A Textbook of Optics, N Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.
5. Introduction to Fiber Optics, Ajoy Ghatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.
6. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO      | TIME (HOURS) | MARKS      |
|--------------|--------------|------------|
| 01           | 08           | 17         |
| 02           | 08           | 17         |
| 03           | 08           | 16         |
| 04           | 08           | 17         |
| 05           | 08           | 16         |
| 06           | 08           | 17         |
| <b>TOTAL</b> | <b>48</b>    | <b>100</b> |

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|---|--|
| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |  |
| Course Code: BS 103   | Course Title: Chemistry and Environmental Sciences |
| Semester: <b>1<sup>st</sup></b>   | Credits: <b>3</b>                                  |
| Periods per week: <b>3 (L:3 T:0 P:)</b>                                   |  |

**Course Objectives:**

The objective of the course is to give the basic concepts of Chemistry and sensitize the students in understanding issues and solutions of Environmental Problems.

**Prior learning requirements:** High School Level Chemistry.

**COURSE CONTENT**

**UNIT 1: CHEMICAL BONDING AND SOLUTIONS: (08 Hours)**

**Concept of chemical bonding** – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H<sub>2</sub>, F<sub>2</sub>, HF hybridization in BeCl<sub>2</sub>, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub>, H<sub>2</sub>O), coordination bond in NH<sub>4</sub><sup>+</sup>, and anomalous properties of NH<sub>3</sub>, H<sub>2</sub>O due to hydrogen bonding, and metallic bonding.

**Solutions** – idea of solute, solvent and solution, methods to express the concentration of solution- molarity & Molality (M = mole per liter), ppm, mass percentage, volume percentage and mole fraction. Concept of pH

## **UNIT 2: CHEMISTRY OF FUELS AND LUBRICANTS**

**(08 Hours)**

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula. Proximate analysis of coal solid fuel, petrol and diesel - fuel rating (octane and cetane numbers),

Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.

Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical properties (viscosity and viscosity index, oiliness, flash and fire point, cloud and pour point only) and chemical properties (coke number, total acid number saponification value) of lubricants.

## **UNIT 3: ELECTRO CHEMISTRY**

**(10 Hours)**

Electronic concept of oxidation, reduction and redox reactions. Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems.

Industrial Application of Electrolysis:

- Electrometallurgy
- Electroplating
- Electrolytic refining.

Application of redox reactions in electrochemical cells

Primary cells – dry cell ,

Secondary cell - commercially used lead storage battery, fuel and Solar cells.

Introduction to Corrosion of metals –

definition, types of corrosion (chemical and electrochemical), H<sub>2</sub> liberation and O<sub>2</sub> absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.

Internal corrosion preventive measures –

Purification, alloying and heat treatment and External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors

**UNIT 4 : ECOSYSTEM**

**(05 Hours)**

Structure of ecosystem, Biotic & Abiotic components

Food chain and food web

Aquatic (Lentic and Lotic) and terrestrial ecosystem

Carbon, Nitrogen, Sulphur, Phosphorus cycle.

Global warming -Causes, effects, process, Green House Effect, Ozone depletion

**UNIT 5: POLLUTION**

**(09 Hours)**

**Air and, Noise Pollution**

Definition of pollution and pollutant, Natural and manmade sources of air pollution and its prevention.

**Water and Soil Pollution**

Sources of water pollution, Types of water pollutants, Characteristics of water pollutants

Turbidity,

pH, total suspended solids, total solids BOD and COD: Definition, calculation

Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods:

Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation

technology, RO (reverse osmosis).

Causes, Effects and Preventive measures of Soil Pollution:

Noise pollution: Sources, Measurement and Prevention of Noise Pollution. Noise Pollution

Regulation and Control Rules.



**UNIT 6: Solid Waste Management, ISO 14000 & Environmental Management (08 Hours)**

Solid waste generation- Sources and characteristics of: Municipal solid waste, E-waste, biomedical waste.

Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste

Air quality act 2004, air pollution control act 1981 and water pollution and control act1996. Structure and role of Central and state pollution control board.

Concept of Carbon Credit, Carbon Footprint.

Environmental management in fabrication industry.

ISO14000: Implementation in industries, Benefits.

**Course Outcome:**

After completion of this course the student will be able to:

**Unit 1**

- Understand the concept of Chemical bonding and its types.
- Understand the concept of mole and solutions.

**UNIT 2**

- Understand the various types of fuels and their uses.
- Understand the importance of Lubrication in Engineering and other applications.

**UNIT 3**

- Understand the laws of Electrolysis and their Industrial applications.
- Understand the various preventive measures for corrosion

**UNIT 4**

- Understand the Structure of Ecosystem.
- Understand the causes of Global Warming

### UNIT 5

- Understand the suitable air, extent of noise pollution, and control measures and acts.
- Understand the water and soil pollution, and control measures and acts.

### UNIT 6

- Understand solid Waste Management, ISO 14000 & Environmental Management

### Recommended Books:

1. Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011
3. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House ,New Delhi

### UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT NO      | TIME (HOURS) | MARKS      |
|--------------|--------------|------------|
| 01           | 08           | 17         |
| 02           | 08           | 17         |
| 03           | 10           | 20         |
| 04           | 05           | 10         |
| 05           | 09           | 19         |
| 06           | 08           | 17         |
| <b>TOTAL</b> | <b>48</b>    | <b>100</b> |

|  |                              |
|--|------------------------------|
| <b>PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |                              |
| Course Code : BS 104   | Course Title: MATHEMATICS -I |
| Semester : 1 <sup>st</sup>   | Credits: 4                   |
| Periods per week: 4 (L:3 T:1 P:0)  |                              |

**Course Objectives:** The objective of the course is to give the concepts regarding Algebra, Trigonometry and Differential calculus, which shall be the basis for applications in Engineering Problem.

**Prior learning requirements:** The students shall have basic knowledge regarding

- (I) principles and laws of algebra
- (II) Polynomials
- (III) Real Number System.

## COURSE CONTENT

### UNIT 1: ALGEBRA

(24 Hours)

- (I) **Partial fractions:** Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction. (06)
- (II) **Permutations and Combinations:** Concept of permutations and Combinations: Value of  ${}^n P_r$   ${}^n C_r$  , addition and multiplication theorems, circular permutations. (06)
- (III) **Binomial theorem:** Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems (06)

- (IV) **Complex Numbers:** Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus, and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number. De-moivier's theorem, its application (06)

**UNIT 2: TRIGONOMETRY**

**(16 Hours)**

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles Sum, difference formulae and their applications Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of sin x, cos x, tan x and e<sup>x</sup>, Concept of Inverse Trigonometric functions.

**UNIT 3: DIFFERENTIAL CALCULUS**

**(24 Hours)**

- (I) Definition of function; Concept of limits.

Four standard limits

$$\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a},$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{x}$$

$$\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$$

$$\lim_{x \rightarrow 0} (1+x)^{1/x}$$

- (i) Definition of function; Concept of limits.  
 (II) Differentiation by definition of x<sup>n</sup>, sin x, cos x, tan x, e<sup>x</sup>, log x only  
 (III) Differentiation of trigonometric inverse functions. Logarithmic differentiation. Exponential differentiation Successive differentiation (excluding nth order).  
 (IV) Applications:  
 (a) Maxima and minima (b) Equation of tangent and normal to a curve (for explicit functions only)

**Course Outcome:**

After completion of this course the student will be able to:

**Unit 1:**

- Understand the Concept of functions and their splitting into simpler functions.
- Count without actual counting.
- Expand the higher degree algebraic polynomials.
- Learn the extended number line system and find roots of equations which do not have real solutions.

**Unit 2:**

- Learn alternative approach of measuring distances through angles.
- Study the sides and angles, and their relationship in triangles.

**Unit 3:**

- Have Notion of Nearness
- Learn instantaneous rates of changes.
- Learn to optimize the function.

**Recommended Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| <b>UNIT NO</b> | <b>TIME (HOURS)</b> | <b>MARKS</b> |
|----------------|---------------------|--------------|
| 01             | 24                  | 38           |
| 02             | 16                  | 24           |
| 03             | 24                  | 38           |
| <b>TOTAL</b>   | <b>64</b>           | <b>100</b>   |

|  |                                    |
|--|------------------------------------|
| <b>PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |                                    |
| Course Code : ES 105   | Course Title: Engineering Graphics |
| Semester : 1 <sup>st</sup>   | Credits: 2                         |
| Periods per week: 4 (L:0 T:0 P:4)  |                                    |

**Course Objectives:**

- (I) To understand the language of graphics, which is used to express ideas, convey instructions in the form of drawings, shapes.
- (II) To develop skills to visualize actual object or a part of it on the basis of drawings. Also, to develop skills to translate ideas into sketches

**Prior learning requirements:** No Prior Learning is required. However, the basic skill of drawing lines and basic shapes shall be advantage to the student in this course.

**COURSE CONTENT.**

**UNIT 1: BASIC ELEMENTS OF DRAWING. (08 Hours)**

Introduction to drawing, drawing instruments and supporting materials. Method to use instruments and material with applications for neat and clean drawing. Types of drawing sheets. Concept of margin on sheet. Difference between painting and drawing. Introduction to latest instruments and software's for drawing.

Conventions of lines and their applications.

Representative fractions- reduced enlarged and full-size scales; engineering scales such as plain and diagonal scale. Letter writing.

Dimensioning techniques as per SP-46:2003- types and applications of chain, parallel and coordinate dimensioning. Dimensioning of various basic figures and shapes.

**UNIT2: ORHTOGRAPHIC PROJECTIONS.**

**(18 Hours)**

Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications.

Introduction to orthographic projection, First angle and Third angle method, their symbols.

Projection of points in all quadrants. Projection of lines and surface in 1<sup>st</sup> and 3<sup>rd</sup> angle only.

Projection of solid surface and thereby identification of surfaces.

Concept of sectioning, Sectional views and need for sectional views. Conventional sectioning of materials and conventional breaks of various basic shapes.

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces.

(all drawings on sketch book)

**UNIT3: ISOMETRIC PROJECTIONS**

**(08 Hours)**

Introduction to isometric projections.

Isometric scale and Natural scale.

Isometric view and isometric projection.

Illustrative problems related to objects containing lines, circles and arcs shape.

Isometric projections of prism cone, frustum, slab, Sphere, cylinder.

Conversion of orthographic views into isometric view/projection.



**UNIT 4: FREE HAND SKETCH**

**(06 Hours)**

Free hand sketching of triangle, square, pentagon, hexagon, circles.

Ellipses, Parabola. Various methods of drawing of shapes. (Knowledge purpose only).

Free hand orthographic sketching on squared graph paper.

Free hand isometric sketching on isometric grid paper.

**UNIT5: COMPUTER AIDED DRAFTING INTERFACE**

**(06 Hours)**

Computer Aided Drafting: concept

Hardware and various CAD software available.

System requirements and understanding the interface

Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon

File features: new file, Saving the file, opening an existing drawing file, creating templates, Quit.

Setting up new drawing: Units, Limits, Grid, Snap

Undoing and redoing action

**UNIT 6: COMPUTER AIDED DRAWING (AUTOCAD)**

**(18 Hours)**

Introduction to co-ordinate system.

Method of Specifying points: Absolute coordinates, Relative Cartesian, and Polar coordinates

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Polyline.

Modify and edit commands like trim, extend, delete, copy, offset, array, hatch, block, layers.

Drawing of objects which were drawn by free sketching in UNIT-III

Draw Orthographic Projections and isometric projections.

**Course Outcome:**

After completion of this course the student will be able to:

**UNIT 1**

- Understand the concept of Drawing and Drawing Instruments.
- Understand the Concept of scales and their selection.
- Use appropriate dimensioning techniques.

**UNIT 2**

- Understand Quadrant systems and Orthographic Projections.
- Draw and identify the solid Surfaces.
- Visualize hidden elements by concept of sectioning.
- Covert Isometric views into orthographic projections.

**UNIT 3**

- Convert Orthographic views into Isometric Views.

**UNIT 4**

- Sketch all basic shapes free handedly.

**UNIT 5**

- Learn the use of Computers and software's for Drawing

**UNIT 6**

- Acquire skills to use Auto Cad to draw various types of shapes, orthographic projections, and isometric projections. (2D and 3D).

**RECOMMENDED BOOKS**

1. Bhatt, N.D. Engineering Drawing. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93-80358-17-8
2. Bureau of Indian Standards. Engineering Drawing Practice for Schools and Colleges IS: Sp-46. BIS. Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2.
3. Jain & Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978- 93-86173-478)
4. Jeyapoovan, T. Essentials of Engineering Drawing and Graphics using AutoCAD. Vikas Publishing House Pvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
5. Autodesk. AutoCAD User Guide. Autodesk Press, USA, 2015

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| <b>UNIT NO</b> | <b>TIME (HOURS)</b> | <b>MARKS</b> |
|----------------|---------------------|--------------|
| 01             | 08                  | 12           |
| 02             | 18                  | 28           |
| 03             | 08                  | 12           |
| 04             | 06                  | 10           |
| 05             | 06                  | 10           |
| 06             | 18                  | 28           |
| <b>Total</b>   | <b>64</b>           | <b>100</b>   |

|   |                                |
|---|--------------------------------|
| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |                                |
| Course Code: ES 106   | Course Title: GENERAL WORKSHOP |
| Semester: 1 <sup>st</sup>   | Credits: 2                     |
| Periods per week: <b>4 (L:0 T:0 P:4)</b>                                  |                                |

**Course Objectives:**

- To understand basic engineering processes for manufacturing and assembly
- To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's
- To understand and interpret job drawings, produce jobs, and inspect the job for specified dimensions
- To understand the various types of wiring systems and acquire skills in house wiring
- To understand, operate, control different machines and equipment's adopting safety practices

**COURSE CONTENT:**

**UNIT I : GENERAL WORKSHOP**

**(02 Hours)**

Introduction and Importance of Engineering Workshop.  
 Importance of safety and cleanliness  
 Safety measures and upkeep of tools and environmental shops  
 Types of workshops.  
 Introduction to Machinery and material used in Engineering Workshops.

**UNIT 2: CARPENTRY SHOP**

**(08 Hours)**

i) Introduction to Carpentry shop ii) demonstration and introduction to various types of wood, an introduction to timber iii) seasoning of wood iv) Demonstration of different wood working tools / machines. iv) Demonstration and practicing of different wood working processes, like sawing, planing, marking, chiseling, grooving, turning of wood etc. iv) simple jobs involving any one joint like mortise and tenon dovetail, bridle, half lap etc. v) painting of wood by manual and machine.

**UNIT3: FITTING SHOP**

**(08 Hours)**

I) Material used in fitting shop and Demonstration of different fitting tools (like bench vice, v-block with clamp, c clamp), marking & measuring tools (like surface plate, angle plate, scribing block, try square, combination set, calipers), finishing tools (files, hand file, flat file, square file, triangular file, round files), machineries (like drilling machine, chop saw, grinder, their specifications and care), etc. ii) Demonstration and practicing of different operations like chipping, filing, drilling, tapping, sawing, cutting, punching etc. iii) some simple fitting jobs involving practice of chipping, filing, drilling, tapping, cutting, punching etc. iv) Paint job after fitting.

**UNIT4: WELDING SHOP:**

**(10 Hours)**

i) Introduction to welding, Arc welding, gas welding, resistance welding, electron beam welding, laser beam welding ii) Safety precautions in welding shop iii) Introduction to ARC welding processes. iii) Machines used and filling material used for arc welding processes. Demonstration and practicing of Arc welding machine. iv) introduction to gas welding v) high pressure gas welding and low-pressure gas welding v) low pressured acetylene generation from calcium carbide vi) Demonstration and practice of oxy-acetylene gas welding (both high pressure and low-pressure gas welding) vii) Demonstration on MIG, TIG, SPOT welding, and rebuilding of broken parts with welding. viii) Quality weld and defects in welding. how to avoid defects in welding ix) Simple jobs involving butt and lap joint on both high-pressure gas welding and low-pressure gas welding. ix) Metal cutting by gas welding. painting after weld

**UNIT 5: SHEET METAL SHOP**

**(08 Hours)**

i) introduction to sheet metal shop ii) metallic sheets (tin, copper, brass) & material used ii) Demonstration of different sheet metal tools / machines (like tammel, Wire Gauge, hammers, s takes, hand shearing machine, foot operated shearing and bending machine, soldering, and brazing machines. ii) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting. iii) simple jobs involving sheet metal operations, sheet metal joints, surface development, tray making, funnel making, cylinder, soldering & riveting. Iv) Introduction to Aluminum frame works. V) Painting of sheets.

**UNIT 6: ELECTRICAL SHOP**

**(08 Hours)**

i) Material used in electrical workshop ii) safety precautions during AC and DC electrical wirings. iii) demonstration of tools used in electrical workshop iv) Practice on simple lamp circuits (iv) one lamp controlled by one switch by surface conduit wiring, (iv) Lamp circuits- connection of lamp and socket by separate switches, (vi) Connection of Fluorescent lamp/tube light, (vii) simple lamp circuits-install bedroom lighting. And (v) Simple lamp circuits- install staircase wiring. viii) introduction to smart switches and lamps. ix) identification of different types of batteries and their specifications. Series and parallel connection of batteries. Battery charging with manual charger and solar plate charging. Invertor connection with batteries. Demonstration and practice of digital and manual multimeters.

**UNIT 7: ELECTRONIC SHOP**

**(08 Hours)**

i) Introduction to electronic workshop. ii) Familiarization/application of testing instruments and commonly used tools (like Multimeter, function generator, power supply, DSO, Soldering iron, pliers, cutters, wire strippers, tweezers, crimping tool, bread board, hot air soldering and desoldering station) iii) material used in electronic shop. iii) practicing of soldering and brazing. Iv) demonstration of soldering station and soldering guns. V) demonstration of electronic items like, PCB, led, transformers, capacitors, inductors, resistors, diodes, transistors etc.

**UNIT8: PLUMBING SHOP**

**(08 Hours)**

l) introduction to plumbing. ii) piping material used and demonstration of tools/equipment's used for plumbing iii) threading of plastic and GI pipes. iv) demonstration of valves and meters, water geysers, installing water supply fitting on GI, PVC, PPR &, PEX pipes. v) Demonstration and practice of PPR pipe jointing welding machine. Simple jobs on water connection from tank to tap.

**RECOMMENDED BOOKS**

1. S.K. Hajara Chaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015
2. B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi 2014
3. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad 2014

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|---|---------------------------|
| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |                           |
| Course Code: BS 107   | Course Title: PHYSICS LAB |
| Semester: <b>1<sup>st</sup></b>   | Credits: <b>01</b>        |
| Periods per week: <b>2 (L:0 T:0 P:2)</b>                                  |                           |

**LIST OF PRACTICALS’:**

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier caliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge
3. To find the moment of inertia of a flywheel.
4. To investigate Simple Harmonic Motion using a Simple pendulum and an oscillating spring and to determine the spring constant of a spring.
5. To determine and verify the time period of a cantilever.
6. To determine velocity of ultrasonic in different liquids using ultrasonic interferometer.
7. To verify laws of reflection from a plane mirror/ interface.
8. To verify laws of refraction (Snell's law) using a glass slab.
9. To determine focal length and magnifying power of a convex lens.
10. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
11. To measure numerical aperture (NA) of an optical fiber.



**COURSE OUTCOME:**

After undergoing this lab work, the student will be able to:

- Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.
- Understand rotational motion and determine M.I. of a rotating body (flywheel)
- Understand the basics of SHM and determine the spring constant also.
- Use of equipment for determining velocity of ultrasonics in different liquids.
- Verify optical laws; reflection, refraction from plane interfaces and surfaces.
- Apply knowledge of optics to determine focal length and magnifying power of optical lenses.
- Work with laboratory lasers and understand method to measure the wavelength of the light emitted from a laser.
- Handle optical fibers and determine numerical aperture of given optical fiber.

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| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |                             |
| Course Code: BS 108   | Course Title: CHEMISTRY LAB |
| Semester: <b>1<sup>st</sup></b>   | Credits: <b>01</b>          |
| Periods per week: <b>2 (L:0 T:0 P:2)</b>                                  |                             |

### **LIST OF PRACTICALS:**

#### **Volumetric and Gravimetric analysis:**

1. Preparation of standard solution of oxalic acid or potassium permanganate.
2. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
3. Standardization of KMnO<sub>4</sub> solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by KMnO<sub>4</sub> solution.
4. Volumetric estimation of
  - a. Total hardness of given water sample using standard EDTA solution.
  - b. Alkalinity of given water sample using 0.01M sulphuric acid
5. Proximate analysis of coal
  - a. Gravimetric estimation moisture in given coal sample
  - b. Gravimetric estimation ash in given coal sample

#### **Instrumental analysis**

6. Determine the conductivity of given water sample.
7. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
8. Determination of viscosity of lubricating oil using Redwood viscometer.
9. Determination of melting point of Organic Compounds by Melting point apparatus.
10. To verify the first law of electrolysis of copper sulfate using copper electrode.
11. Construction and measurement of emf of electrochemical cell (Daniel cell).
12. To determine the PH of Fruit Juices.

### **COURSE OUTCOMES:**

At the end of the course student will be able to:

- Express quantitative measurements accurately.
- Practice and adapt good measuring techniques.
- Use various apparatus for precise measurements.
- Understand and differentiate different methods of quantitative analysis.
- Know and understand principles of quantitative analysis using instruments.
- Construct different electrochemical cells used in developing batteries.

### RECOMMENDED BOOKS

- Chemistry in Engineering by J.C. Kuricose And J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
- Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company New Delhi.
- Engineering Chemistry by Shashi Chawla.
- Modern's Abc of Chemistry Vol I and II by Dr. S.P.Jauhar, Modern Publishers, New Delhi
- A textbook of Biochemistry and Clinical Pathology by Sukhdev Singh and Om Parkash

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| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |   |
| Course Code: HS 109   | Course Title: Language and Communication skills Lab |
| Semester: <b>1<sup>st</sup></b>   | Credits: <b>01</b>                                  |
| Periods per week: <b>2 (L:0 T:0 P:2)</b>                                  |   |

**Course Content:**

**Unit 1: Listening Skills**

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

**Unit 2: Introduction to Phonetics**

Sounds: Consonant, Vowel, Diphthongs. Syllable division, word stress, intonation, voice etc.

**Unit 3: Speaking Skills**

Introducing oneself and others

Standard and formal speech: Group discussion, oral presentations, public speaking etc.

Conversation practice and role playing, mock interviews etc.

**Unit 4: Building vocabulary**

Antonyms and Synonyms, Prefix and Suffix, Phrasal verbs, idioms and phrases. Word exercises and word games to enhance self-expression and vocabulary .

**Recommended Books:**

1. James Hartman& et al. Ed. English Pronouncing Dictionary. Cambridge: Cambridge University Press, 2006.
2. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed. 2018)

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| <b>PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING AND TECHNOLOGY</b> |   |
| Course Code: HS 110   | Course Title: - Self learning/Life skills |
| Semester: <b>1<sup>st</sup></b>   | Credits: <b>02</b>                        |
| Periods per week: <b>2 (L:2 T:0 P:0)</b>                                  |   |

**Course Objective: -**

**Self-Learning /Life skills :-** The self-learning plays a very important role in the learning process and needs due credit Extra learning outside Institutional timing and online/digital learning needs encouragement. Apart from this participation in debates, seminars, sports and Extra- co curricula activities shall be given due importance and credit. Participation by student in such activities needs to be given due importance and credit. Apart from knowledge and skill, developing right attitude is of great significance in the real life situations. This can be better achieved by introducing the life skills and capability of handling the real life future challenges and situations. Activities in sports, Yoga and other activities plays a role in physical and psychological development and must form a part in the institutional processes. Prior learning of the student also needs to be given due credit.

The introduction of this course is to introduce these activities and award them on choice of student.

**Contents of the Course:**

- Concept and need of life skills
- Self-awareness
- Decision making
- Problem solving
- Effective communication
- Interpersonal relations
- Stress management
- Empathy
- Critical thinking

**Course Outcome:**

After completion of this course the student will be able to:

- Identify different skills required in personal and professional life.
- Develop Consciousness of self.
- Use critical thinking and decision-making skill to solve problems.
- Communicate effectively with others.
- Establish interpersonal relations
- Apply techniques to cope with emotions and stress.

**Implementation:** - At the start of the semester the HOD/Academic in-charge may register the student for course of life skill or may be given a choice to register for any online course activity . Such course and activity needs to be monitored, evaluated and shall be given credits as prescribed.